PENRITH-LITHGOW
STRATEGIC TRANSPORT CORRIDOR

Infrastructure Proposal

Dual Highway and Rail Corridor
Connecting Sydney to Western NSW

January 2026

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Executive Summary

This proposal outlines a transformative infrastructure project connecting Penrith to Lithgow via a direct, grade-separated transport corridor comprising both a four-lane highway and railway line. The project addresses critical inefficiencies in the current Great Western Highway route while unlocking significant economic development potential for Western NSW.

Project Element	Details
Total Distance	58 kilometres (straight line)
Elevation Gain	898 metres (Penrith 32m to Lithgow 930m)
Constant Gradient	1.55% uphill grade (well within highway standards)
Estimated Cost	$15-18 billion (dual highway and rail corridor)
Time Savings	60+ minutes compared to current route

Problem Statement

Current Route Deficiencies

The existing Great Western Highway between Penrith and Lithgow presents significant operational challenges that constrain economic growth and compromise safety:

Multiple Urban Zones: All through-traffic currently passes through Glenbrook, Blaxland, Springwood, Lawson, Katoomba, Leura, and multiple other townships, encountering dozens of school zones (40 km/h), residential speed limits, traffic signals, and pedestrian crossings.

Severe Journey Time Impact: A route that should take 30-35 minutes at highway speeds currently requires 90+ minutes during peak periods, representing a 200% time penalty.

Safety Concerns: Heavy freight vehicles and passenger traffic mix with local traffic, school zones, and residential areas, creating ongoing safety risks for communities.

Geographic Constraints: The Blue Mountains escarpment rises sharply from 32 metres (Penrith) to peaks of 1,180 metres, with the current route following challenging topography through steep grades and winding alignments.

Western NSW Isolation: The inefficient connection from Sydney to Bathurst, Orange, Dubbo, and beyond limits economic integration, freight efficiency, and regional development potential.

Proposed Solution

Design Overview

The proposal calls for a direct transport corridor utilizing modern tunneling and viaduct technology to maintain a constant 1.55% gradient from Penrith (32m elevation) to Lithgow (930m elevation) over 58 kilometres. This gentle grade eliminates the need to follow existing topography and allows for optimal speed and efficiency.

Engineering Components

Primary Tunnel System

A major tunnel system of 30-40 kilometres would bore through the Blue Mountains sandstone formation at a constant 1.55% uphill gradient. This approach is similar to modern Alpine base tunnels (such as the Gotthard Base Tunnel) that avoid mountain peaks by tunneling deep beneath them.

Tunnel Specifications:
- Dual-bore configuration (one bore per direction) for safety and operational flexibility
- Each bore: 4 lanes wide (2 lanes per direction) plus emergency lanes
- Adjacent railway tunnel bore for future/concurrent rail development
- Full safety systems: ventilation, emergency egress, fire suppression, communications
- Modern tunnel boring machine (TBM) construction through Hawkesbury Sandstone

Viaduct Systems

Approximately 10-15 kilometres of elevated viaduct structures would bridge valleys, gorges, and transitional zones between tunnel portals and surface sections. These structures would:
- Maintain the constant gradient where tunnel portals emerge at different elevations
- Span deep Blue Mountains valleys (some exceeding 760 metres in depth)
- Connect approach sections near Penrith and Lithgow
- Support both highway and railway infrastructure

Surface Sections

Short surface sections (approximately 5-10 kilometres total) would provide approach alignments at both terminals and potentially intermediate access points. These would integrate with existing road networks at Penrith and Lithgow.

Route Alignment Benefits

The direct alignment offers several critical advantages:

Minimal Urban Impact: The straight-line route passes primarily through uninhabited Blue Mountains National Park. The alignment avoids all major townships (Glenbrook, Blaxland, Springwood, Katoomba, Leura, Wentworth Falls, etc.) which cluster along the existing highway corridor to the north.

Limited Property Acquisition: May clip edge areas of Emu Plains (western Penrith) and rural properties near Hartley or Lithgow outskirts, but no major town centers would be disturbed. Deep tunnel sections eliminate surface impact across the Blue Mountains.

Environmental Considerations: While tunneling through national park requires environmental assessment, the underground alignment minimizes surface disruption compared to a surface highway traversing the same distance.

Geological and Engineering Feasibility

Rock Conditions

The Blue Mountains are primarily composed of Hawkesbury Sandstone, a sedimentary formation that has been successfully tunneled through numerous Sydney infrastructure projects.

Rock Type	Compressive Strength	Mohs Hardness
Hawkesbury Sandstone (Blue Mountains)	Up to 70 MPa	6-7
Korean Granite (comparison)	~130 MPa	6-7

Tunneling Feasibility

While Korean granite used in successful long-distance railway tunnels is nearly twice as strong as Hawkesbury Sandstone (130 MPa vs 70 MPa), both materials share similar surface hardness (6-7 on Mohs scale) and are well-suited to modern tunnel boring machines.

The Blue Mountains sandstone has been successfully tunneled through in multiple Sydney projects, demonstrating proven feasibility. The sedimentary nature of sandstone can present different challenges than igneous granite (such as horizontal layering and variable porosity), but these are well-understood and manageable with modern tunneling techniques.

Cost Estimates

Construction Cost Breakdown

Cost estimates are based on comparable Australian tunnel and viaduct projects, adjusted for the dual highway-rail configuration:

Component	Unit Cost	Total Cost
Main Tunnel System (30-40km, dual highway + rail bores)	$200-300M/km	**$6-12B**
Viaduct Systems (10-15km, dual highway + rail)	$150-200M/km	**$1.5-3B**
Portals, Surface Sections, Interchanges, Systems	N/A	**$1-2B**
ESTIMATED TOTAL COST		**$8.5-17B**
MID-RANGE ESTIMATE		**$12-14B**

Cost Context and Comparison

For context, Sydney's WestConnex project (33km motorway with 22km of tunnels) escalated from an initial $10 billion estimate to over $45 billion. This project's estimated $12-14 billion for 58km with 30-40km of tunnels represents significantly better value, particularly when including the railway component.

The cost estimate is deliberately conservative and includes contingencies for geological challenges, environmental mitigation, and safety systems. Actual costs could be reduced through:

- Competitive international tendering
- Economies of scale from dual highway-rail construction
- Value engineering during detailed design phase
- Lessons learned from recent Australian tunnel projects

Recommended Construction Approach

International Expertise with Local Employment

This project would benefit from a procurement model that leverages international tunneling expertise while ensuring substantial Australian workforce participation and skills transfer.

Recommended Contractors: Korean Firms

Primary Recommendation:

SK Engineering & Construction (SK ecoplant)
• Extensive experience with long-distance railway tunnels through challenging granite formations
• Successfully completed multiple 20+ km tunnel projects in mountainous Korean terrain
• Proven track record with combined highway-rail corridor projects
• Advanced TBM technology and safety systems

Hyundai Engineering & Construction
• Major infrastructure contractor with tunnel expertise
• Experience with both road and rail tunnel systems
• Strong safety record and quality management systems

Samsung C&T Corporation
• Diverse infrastructure portfolio including complex tunnel projects
• Advanced engineering capabilities
• International project experience

Alternative: Chinese Contractors

China Railway Construction Corporation (CRCC)
• World's largest infrastructure contractor
• Extensive high-speed rail and tunnel experience
• Competitive pricing and rapid project delivery

China Communications Construction Company (CCCC)
• Major tunneling and bridge expertise
• Experience with challenging mountain terrain
• Cost-competitive delivery model

Australian Joint Venture Partners

To maximize local benefit, international contractors should form joint ventures with established Australian firms:
• CPB Contractors (CIMIC Group)
• John Holland Group
• Lendlease Engineering
• Acciona Australia

Mandatory Local Employment Requirements

Proposed Contract Terms:

Minimum 50% Australian workforce across all project phases
• Ensures substantial employment for Australian workers
• Creates opportunities for regional communities
• Builds Australian capability in advanced tunneling techniques

Skills Transfer Requirements
• Mandatory training programs for Australian workers in TBM operation and advanced tunneling
• Technology transfer agreements for tunnel construction methodologies
• Joint supervision teams pairing international experts with Australian engineers

Australian Content Requirements
• Preference for Australian suppliers for materials and equipment where competitive
• Engagement of Australian engineering consultants and specialists
• Support services to be sourced locally where possible

Project Benefits and Justification

Immediate Operational Benefits

Journey Time Savings: Current route requires 90+ minutes during peak periods for a journey that could be completed in approximately 30 minutes via direct highway. This represents 60+ minute savings per trip, with compounding benefits for:
• Commercial freight operators (reduced fuel, labor, and vehicle wear costs)
• Business travelers and commuters
• Tourism access to Western NSW
• Emergency services and disaster response

Urban Area Relief: Removing through-traffic from Blue Mountains townships eliminates:
• Heavy vehicles from school zones and residential streets
• Traffic congestion in Katoomba, Leura, Springwood, and other centers
• Noise and air quality impacts on mountain communities
• Safety risks from mixing freight and local traffic

Grade Efficiency: The constant 1.55% gradient eliminates the current route's steep climbs, sharp curves, and elevation changes. Heavy vehicles particularly benefit from steady grades versus the current challenging mountain route.

Strategic Regional Development

Opening Western NSW: Fast, efficient connection transforms the relationship between Sydney and major regional centers:

Bathurst (60km from Lithgow): Effectively becomes 90 minutes from Sydney instead of 3+ hours, enabling business integration, educational connections, and population growth.

Orange (90km from Lithgow): Major regional city becomes viable for businesses requiring Sydney connections while maintaining regional lifestyle.

Dubbo and Beyond: Entire central-west region gains improved freight access and economic connectivity to Australia's largest city.

Decentralization Support: Improved connectivity enables genuine regional growth as an alternative to Sydney metropolitan expansion, supporting NSW Government decentralization objectives.

Railway Component Benefits

The inclusion of railway infrastructure alongside the highway creates transformative opportunities:

Freight Rail: A flat, direct rail route avoiding the current Blue Mountains rail climb would revolutionize freight movement to/from Western NSW, reducing costs and enabling competitive inland agriculture and industry.

Future Passenger Rail: Creates option for fast passenger rail service to Bathurst, Orange, and potentially Dubbo, supporting regional population growth and reducing car dependency.

Inland Rail Integration: Potential connection point for future inland rail networks, creating a western bypass for freight avoiding metropolitan Sydney entirely.

Shared Construction Economics: Building highway and rail simultaneously reduces total project costs compared to separate projects while creating a strategic transport corridor.

Resilience and Redundancy

Disaster Redundancy: The existing Great Western Highway is vulnerable to:
- Bushfire closures (regular summer occurrences)
- Snow and ice events (winter closures)
- Landslides and rockfalls
- Severe weather events

A tunneled route provides all-weather, year-round reliability critical for freight movements and emergency access. This strategic redundancy alone carries significant economic value for Western NSW communities dependent on Sydney connections.

Financial Viability and Funding Model

Traffic Volume Reality

Current Great Western Highway traffic volumes (11,000-20,000 vehicles/day) represent only 10-20% of Sydney's major urban motorway traffic. This creates a fundamental challenge for traditional toll-road financing models.

Reality Assessment: This project cannot be justified on immediate toll revenue alone. Direct benefit-cost analysis focusing solely on current traffic would likely show a ratio of 0.3-0.5, meaning the project would not generate sufficient direct returns to justify private sector investment.

Nation-Building Infrastructure Model

This project should be evaluated and funded as strategic nation-building infrastructure similar to:
• Snowy Mountains Hydro-Electric Scheme
• Trans-Australian Railway
• National Broadband Network

The value lies not in immediate financial returns but in:
• Opening an entire region for economic development
• Creating alternatives to continued Sydney metropolitan expansion
• Building long-term freight and logistics efficiency
• Supporting decentralization of population and economic activity

Recommended Funding Structure

Primary Funding: Commonwealth-State Co-investment
• Federal Government: 60% ($9-11 billion)
• NSW Government: 30% ($4.5-5.5 billion)
• User charges/tolls: 10% ($1.5-2 billion)

Supplementary Revenue:
• Modest tolls (not full cost recovery) - estimate $10-15 per trip
• Rail freight charges for commercial users
• Value capture from Western NSW land development enabled by improved access
• Potential private sector partnership for specific components (rest stops, service areas)

Implementation Framework

Project Phases

Phase 1: Planning and Approvals (3-4 years)
• Detailed geological surveys and route optimization
• Environmental Impact Assessment and approvals
• Engineering design and specification development
• Community consultation and stakeholder engagement
• Land acquisition and heritage assessments

Phase 2: Procurement (1-2 years)
• International tender process with local employment requirements
• Contractor selection and joint venture formation
• Final design refinement and value engineering
• Manufacturing and delivery of tunnel boring machines

Phase 3: Construction (8-10 years)
• Access tunnel and portal construction (Years 1-2)
• Main tunnel boring operations (Years 2-8)
• Viaduct construction (concurrent with tunnel work)
• Fit-out: ventilation, safety systems, road surface, rail installation (Years 7-10)
• Surface connections and interchange construction (Years 8-10)

Total Timeline: 12-16 years

Key Success Factors

• Strong political commitment at Commonwealth and State levels
• Clear public messaging about long-term regional development benefits
• Competitive procurement attracting world-class tunneling expertise
• Effective management of environmental and heritage considerations
• Transparent project governance and regular public reporting
• Coordination with related regional development initiatives

Comparison with Alternative Proposals

Recent discussions have proposed a complete tunnel solution from Penrith to Lithgow with cost estimates reaching into the trillions of dollars. This proposal offers a more realistic and cost-effective alternative.

Aspect	Full Tunnel Proposal	This Proposal
Estimated Cost	Trillions (unrealistic)	**$12-14 billion**
Design Approach	58km continuous tunnel	30-40km tunnels + 10-15km viaducts + surface sections
Railway Inclusion	Not specified	**Yes - integrated design**
Constructability	Extremely challenging ventilation and emergency egress	Proven technology and manageable tunnel lengths
Feasibility	Unrealistic cost and timeline	**Achievable with political will**

The hybrid tunnel-viaduct approach offers the optimal balance of:
• Cost effectiveness (avoiding unnecessary tunneling where viaducts suffice)
• Engineering feasibility (manageable tunnel lengths with proven technology)
• Construction timeline (multiple work faces and parallel construction)
• Operational safety (shorter tunnel sections with intermediate access)

Conclusion and Recommendations

The Penrith-Lithgow Strategic Transport Corridor represents a transformative opportunity to address current infrastructure deficiencies while unlocking the economic potential of Western NSW. While the $12-14 billion investment is substantial, it compares favorably to recent urban tunnel projects and delivers far broader strategic benefits.

This project should be pursued because:

1. It solves an existing problem: Current through-traffic imposes significant time penalties and safety concerns on Blue Mountains communities while constraining Western NSW economic development.

2. It's technically feasible: The geology is well-understood and has been successfully tunneled through in Sydney. Korean and Chinese firms have demonstrated capability with longer tunnels through harder rock.

3. It's cost-effective compared to alternatives: At $12-14 billion with railway inclusion, this proposal is far more realistic than trillion-dollar full-tunnel alternatives while delivering comparable benefits.

4. It creates long-term value: The project doesn't just move existing traffic faster—it fundamentally changes the economic geography of NSW by making Western regions viable alternatives to continued Sydney expansion.

5. It builds Australian capability: Mandatory 50% local employment ensures skills transfer and creates lasting infrastructure construction capability while leveraging international expertise.

Recommended Next Steps

1. Commission detailed feasibility study ($5-10 million) covering geological surveys, route optimization, and refined cost estimates.

2. Establish Commonwealth-State working group to develop funding framework and governance structure.

3. Initiate preliminary environmental scoping to identify key approval pathway requirements.

4. Engage with potential international contractors to validate cost estimates and construction methodology.

5. Develop regional economic development strategy to maximize benefits for Western NSW communities.

This project represents genuine nation-building infrastructure. Like the Snowy Scheme or Trans-Australian Railway before it, the value lies not in immediate financial returns but in opening opportunities for future generations. The question is not whether we can afford to build it, but whether we can afford not to.

Appendix A: Technical Specifications Summary

Specification	Value
Total Route Length	58 kilometres
Tunnel Length	30-40 kilometres
Viaduct Length	10-15 kilometres
Surface Sections	5-10 kilometres
Constant Grade	1.55% uphill (Penrith to Lithgow)
Highway Lanes	4 lanes (2 per direction) plus emergency lanes
Railway Configuration	Dual track standard gauge
Design Speed (Highway)	110 km/h
Tunnel Boring Method	Modern TBM through Hawkesbury Sandstone
Estimated Construction Time	8-10 years
Total Project Timeline	12-16 years (including planning and approvals)

Appendix B: Contact Information

For further information regarding this proposal, please contact:

[Your Name]
[Your Title/Organization]
[Contact Email]
[Contact Phone]

Date: January 2026